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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/735,151	12/12/2000	Gert W. Bruning	US 000309	4686

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EXAMINER
NGUYEN, HAU H

ART UNIT	PAPER NUMBER
2676	8

DATE MAILED: 05/07/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/735,151	Applicant(s) BRUNING ET AL.	
	Examiner Hau H Nguyen	Art Unit 2676	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *03* MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *11 March 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-24* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Response to Argument

1. Applicant's arguments filed March 11, 2003 have been fully considered but they are not persuasive. In response to Applicant's arguments on reference Sakaguchi et al. (U.S. Patent No. 6,448,951) (hereinafter *Sakaguchi*) fails to teach the drive circuitry regulating the light output of each sub-array independently of the others, the examiner recites for *Sakaguchi* from column 5, lines 45-51 that the backlight 4 (Fig. 2) is vertically divided into a plurality of backlight sections #0, #1, #2, . . . in the TFT LCD array 3. One backlight section is assigned for a predetermined number of pel lines. The ON/OFF states of the individual backlight sections are independently controlled by the backlight driver 8, and each backlight section corresponds to a color, i.e. red, green, blue (col. 6, lines 60-65). Applicant's specification also discloses that the red, green and blue light of sub-arrays 110R, 110G, 110B are generated sequentially (page 11). In addition, the claimed features of the application do not include the *timing of the activation* of red, or blue, or green LEDs.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-5, 10-17, 19, 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter (U.S. Patent No. 5,724,062) in view of Sakaguchi et al. (U.S. Patent No. 6,448,951).

Referring to claims 1-2, and 24, Hunter discloses a LCD display device using an array of light emitting diodes as backlight. As shown in Figs. 1-4, Hunter teaches the display 20 has an array 25 of light emitting diodes ("LED") as a light source 30. The LED array 25 has a set of at least one red 32, one green 33, and one blue 34 LED, but preferably rows and corresponding columns of interspersed colors of LEDs 32, 33, 34, 35 as illustrated in FIG. 3 (see col. 4, lines 22-35). The display 20 is also provided with the associated drive circuitry 200 (primary circuit) necessary for selectably addressing individual liquid crystal pixels 70 of the LCD 60 and for sequentially and cyclically driving the LEDs 32, 33, 34. A set of one red 32 LED, one green 33 LED, and one blue 34 LED could be directly placed behind the individual selectably addressable liquid crystal pixel 70 to emit light therethrough (col. 5, lines 67-68 and col. 6, lines 1-6).

Thus, Hunter teaches all the limitations of claims 1 and 2, except for the LED drive circuit regulating a red light output of the sub-arrays of red LEDs, a green light output of the sub-arrays of green LEDs, and a blue light output of the sub-arrays of blue LEDs independently of each others.

However, Sakaguchi et al. disclose a liquid crystal display device comprising: a liquid crystal display array divided into a first area, a second area and a third area, in each of which are included a plurality of pel lines; a first means for performing an operation for sequentially writing first color data, selected from data provided for red, green and blue, along the plurality of pel lines in the first area, an operation for sequentially writing second color data, selected from the data provided for red, green and blue, along the plurality of pel lines in the second area, and an operation for sequentially writing third color data, selected from the data provided for red, green and blue, along the plurality of pel lines in the third area; a backlight means, which is

divided into N backlight sections (N is a multiple of 3 and is equal to or greater than 6) and which selectively generates red light, green light or blue light, wherewith N/3 backlight sections illuminate the first area, N/3 backlight sections illuminate the second area and N/3 backlight sections illuminate the third area; and a second means for sequentially activating the N/3 backlight sections for the first area to generate first color light and sequentially displaying the first color data in the first area, for sequentially activating the N/3 backlight sections for the second area to generate second color light and sequentially displaying the second color data in the second area, and for sequentially activating the N/3 backlight sections for the third area to generate third color light and sequentially displaying the third color data in the third area (see col. 1, lines 58-68 and col. 2, lines 1-18). Sakaguchi et al. further teach the backlight 4 (Fig. 2) is vertically divided into a plurality of backlight sections #0, #1, #2, . . . in the TFT LCD array 3. One backlight section is assigned for a predetermined number of pel lines. The ON/OFF states of the individual backlight sections are independently controlled by the backlight driver 8, and each backlight section corresponds to a color, i.e. red, green, blue (col. 6, lines 60-65). Thus, it is implied that each backlight section includes a corresponding controller inside the backlight driver 8.

Therefore, it would have been obvious to one skilled in the art to utilize the method of driving LEDs for backlight of LCD as taught by Sakaguchi et al. in combination with the power regulated converter as taught by Hochstein and incorporate in the LCD device as taught by Hunter in order to achieve a low cost LCD device that uses a currently available low cost write driver, and a low cost liquid crystal material (see col. 1, lines 51-55).

In regard to claim 3, Hunter teaches color filter may not be needed for the LCD display (col. 4, lines 45-46).

In regard to claims 4, 5, and 15, as cited above, Hunter teaches the display 20 is also provided with the associated drive circuitry 200 necessary for selectably addressing individual liquid crystal pixels 70 of the LCD 60 and for sequentially and cyclically driving the LEDs 32, 33, 34.

Referring to claim 10, as shown in Figs. 1, Hunter teach he LED array 25 has a set of at least one red 32, one green 33 and one blue 34 LED, but preferably rows and corresponding columns of interspersed colors of LEDs would be used (col. 3, lines 62-66).

Referring to claim 11, as shown in Fig. 2, and as cited above, Hunter teaches the LED array 25 has a set of at least one red 32, one green 33 and one blue 34 LED.

In regard to claim 12, with reference also to Fig. 2, Hunter depicts the drive circuitry provide light source 30 to the corresponding red, green, and blue array LEDs.

Referring to claim 13, Hunter teaches video or other images are constantly displayed as each pixel 70, 80, and 90 selects the amount of color from the sequentially and cyclically driven light source 30 necessary to define the required color while also providing persistence (col. 7, lines 37-41).

In regard to claims 14 and 16, Hunter teach a large number of red 32, green 33, and blue 34 color pulses are allowed to occur within the time frame that is less than the threshold perceivable by the human eye. In effect, as shown in FIG. 5, the desired color is created by "wrapping" many red 32, green 33, and blue 34 pulses together in a time frame that is less than the threshold perceivable by the human eye (col. 5, lines 26-33).

Referring to claims 17, 19, and 23, as applied to claim 1 above, Hunter and Sakaguchi teaches all the limitations of claims 17, 19, and 23, except for the control circuit includes a separate controller for the LEDs of each sub-array, and at least one controller provide independent control signals for the LEDs of each array. However, as cited above, Sakaguchi et al. further teach the backlight 4 (Fig. 2) is vertically divided into a plurality of backlight sections #0, #1, #2, . . . in the TFT LCD array 3. One backlight section is assigned for a predetermined number of pel lines. The ON/OFF states of the individual backlight sections are independently controlled by the backlight driver 8, and each backlight section corresponds to a color, i.e. red, green, blue (col. 6, lines 60-65).

Therefore, it would have been obvious to one skilled in the art to utilize the method of driving LEDs for backlight of LCD as taught by Sakaguchi et al. in combination with the power regulated converter as taught by Hochstein and incorporate in the LCD device as taught by Hunter in order to achieve a low cost LCD device that uses a currently available low cost write driver, and a low cost liquid crystal material (see col. 1, lines 51-55).

4. Claims 6-8, 18, 20-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunter (U.S. Patent No. 5,724,062) in view of Sakaguchi et al. (U.S. Patent No. 6,448,951), and further in view of Hochstein (U.S. Patent No. 5,783,909).

Referring to claims 6-8, 18, 20-21, as applied to claims 1, 17, and 19 above, Hunter and Sakaguchi teach all the limitation of claims 6-8, as applied to claim 1 above, except for the drive and control circuit comprising a power regulated converter with control electronics having response time in the order of milliseconds.

However, Hochstein discloses a circuit for maintaining the luminous intensity of a light emitting diode including at least one light emitting diode (LED) for producing a luminous intensity; a sensor for sensing a condition proportional to the luminous intensity of the LED and for producing a luminous intensity signal, a power supply electrically connected to the LED for supplying pulses of electrical energy to the LED. The power supply includes a switching device responsive to the luminous intensity signal for adjusting the electrical energy supplied by the pulses per unit of time to adjust the average of the current passing through the LED to maintain the luminous intensity of the LED at a predetermined level (see col. 2, lines 6-18). Hochstein also teaches the circuit uses linear regulation of the LED current, the present invention uses pulse width modulation or frequency variation, or a combination thereof, of a power source to control the average current through the LED(s) (col. 4, lines 45-49), and switch mode supplies include any power source 16 that is turned on and off at a frequency consistent with the other operating parameters of the system. Typically, the switching frequency would extend from 60 Hz to over 50 KHz (col. 5, lines 1-5), which indicates the response time in the order of milliseconds.

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize the circuit for driving array of LEDs as taught by Hochstein to incorporate to the LCD device as taught by Hunter and Sakaguchi in order to maintain the luminous intensity of the LEDs and increase the average current through the LED to compensate for a loss of luminous output, and vice versa (col. 2, lines 34-36).

In regard to claim 22, as shown in Figs. 1 and 2, Hochstein further teaches the control of power supply (D.C. power) output voltage or output current is most efficiently accomplished by varying the pulse width or frequency of the switched waveform (col. 4, lines 50-54).

Therefore, it would have been obvious to one skilled in the art at the time the invention was made to utilize the circuit for driving array of LEDs as taught by Hochstein to incorporate to the LCD device as taught by Hunter and Sakaguchi in order to produce a constant, relatively ripple free output (col. 4, lines 54-56).

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hau H. Nguyen whose telephone number is: 703-305-4104. The examiner can normally be reached on MON-FRI from 8:30-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on 703-308-6829.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D. C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2600 only)

Hand-delivered response should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

H. Nguyen

05/05/2003

Matthew C. Bella

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